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Table 1.1. Dormant Season Agricultural Use of Diazinon by crop in Lower SJR Basin (1995-2002) in lbs. of a.i.

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	28,893	35,134	18,743	33,640	37,948	10,668	18,719	17,680	25,178	65.32%
PEACH	7,383	6,518	4,599	5,353	5,552	4,022	4,068	5,499	5,374	13.94%
APRICOT	6,622	3,945	920	2,712	2,350	2,516	113	113	2,411	6.26%
PRUNE	2,676	1,269	1,213	486	1,851	1,273	821	2,840	1,554	4.03%
APPLE	3,113	2,593	2,514	1,008	752	686	446	395	1,438	3.73%
NECTARINE	1,452	1,219	1,046	1,213	1,306	1,213	1,151	794	1,174	3.05%
PLUM	1,259	953	786	779	681	837	982	456	842	2.18%
TOTAL	51,398	51,631	29,821	45,191	50,440	21,215	26,300	27,777	NA	98.51%

* % Average values do not sum to 100% as crops with less than 1% average use are not shown

Table 1.2. Irrigation (in-season) Agricultural Use of Diazinon by Crop in Lower SJR (1995-2002) in lbs. of a.i.

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	35,371	13,050	2,134	227	683	168	90	2	6,466	26.84%
CANTALOUPE	2,963	3,185	4,297	877	2,977	2,163	2,797	2,653	2,739	11.37%
PEACH	3,954	3,807	2,433	993	1,670	2,375	2,376	597	2,276	9.45%
TOMATO	2,207	1,701	363	835	812	3,765	2,977	695	1,670	6.93%
MELON	2,111	1,630	1,897	1,616	1,982	1,007	964	1,979	1,648	6.84%
PRUNE	984	1,210	518	4,205	1,979	2,302	414	1,311	1,615	6.71%
WALNUT	2,137	1,634	2,606	975	311	1,357	1,398	61	1,310	5.44%
APRICOT	2,075	1,631	894	1,186	1,544	743	212	83	1,046	4.34%
ALFALFA	3,099	3,456	177	307	1	0	0	0	880	3.65%
APPLE	1,742	1,877	528	283	771	587	292	723	850	3.53%
NECTARINE	1,451	1,140	569	430	727	1,282	750	113	808	3.35%
PLUM	1,433	976	364	157	350	225	274	21	475	1.97%
BEANS	498	538	845	254	10	829	100	0	384	1.59%
WATERMELON	158	212	798	300	377	131	186	131	287	1.19%
GRAPE, WINE	621	281	268	82	202	40	68	381	243	1.01%
TOTAL	60,804	36,328	18,691	12,727	14,396	16,974	12,898	8,750	NA	94.21%

* % Average values do not sum to 100% as crops with less than 1% average use are not shown

Table 1.3. Dormant Season Agricultural Use of Chlorpyrifos by crop in Lower SJR Basin (1995-2002) in lbs. of a.i.

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	9,668	10,430	3,966	6,625	8,109	1,520	7,509	7,844	6,959	52.65%
APPLE	4,713	3,006	2,867	2,626	2,433	1,751	1,415	1,190	2,500	18.92%
PEACH	2,754	1,803	1,066	785	1,040	832	2,120	3,002	1,675	12.68%
ALFALFA	1,868	427	816	15	70	2,266	136	105	713	5.39%
FIG	0	0	0	0	259	0	4,871	0	641	4.85%
NECTARINE	48	60	319	241	407	244	97	32	181	1.37%
GRAPE	0	0	704	40	0	203	214	24	148	1.12%
TOTAL	19,051	15,726	9,738	10,332	12,318	6,816	16,362	12,197	NA	96.98%

* % Average values do not sum to 100% as crops with less than 1% average use are not shown

Table 1.4. Irrigation (in-season) Agricultural Use of Chlorpyrifos by Crop in Lower SJR (1995-2002) in lbs. of a.i.

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	71,339	93,617	104,911	109,162	76,902	88,371	76,374	55,776	84,556	39.23%
COTTON	116,733	24,561	44,867	23,104	18,960	17,656	20,716	5,666	34,033	15.79%
ALFALFA	59,720	46,583	36,515	40,857	22,684	25,180	17,163	14,682	32,923	15.28%
WALNUT	34,281	34,829	31,196	28,923	26,436	24,160	29,588	26,002	29,427	13.65%
CORN	13,250	7,403	11,551	8,812	13,110	12,932	7,475	7,077	10,201	4.73%
APPLE	10,710	9,334	9,955	12,542	4,459	2,290	662	66	6,252	2.90%
SUGARBEET	3,455	3,478	4,842	6,505	7,216	3,234	3,152	2,327	4,276	1.98%
ORANGE	4,060	2,937	1,782	5,092	7,010	2,059	2,936	3,885	3,720	1.73%
SWEET POTATO	1,122	1,794	2,691	3,061	5,571	3,964	5,539	721	3,058	1.42%
GRAPE	0	514	1,117	5,964	3,808	2,243	5,253	2,569	2,684	1.25%
TOTAL	314,670	225,050	249,427	244,022	186,156	183,089	168,858	118,771	NA	97.96%

* % Average values do not sum to 100% as crops with less than 1% average use are not shown.

Table 1.5. Annual Exceedances of Proposed Diazinon Acute Toxicity Target at the Mainstem Sites of the San Joaquin River (1991 – 2005)

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SJR near Vernalis	**0%**[a] 160[b]	**2.5%** 200	**12%** 266	**16%** 120	**0%** 14	NS	**0%** 34	**0%** 43	**0%** 44	**0%** 74	**14%** 65	**0%** 11	**0%** 36	**0%** 31	**0%** 38
SJR at Maze Blvd.	**0%** 3	**40%** 5	**50%** 2	NS	NS	NS	NS	NS	NS	NS	**0%** 20	NS	NS	NS	NS
SJR at Crows Landing	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	**0%** 23	**0%** 6	**0%** 34	**0%** 15	NS
SJR near Patterson	NS	NS	NS	**0%** 5	NS	NS	NS	NS	NS	**0%** 1	**0%** 40	**0%** 9	NS	NS	**0%** 8
SJR near Newman	**0%** 5	**4.5%** 22	**50%** 2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SJR near Stevinson at Lander Ave.	**0%** 3	**0%** 5	**50%** 2	**0%** 1	NS	NS	NS	NS	NS	**5%** 20	**2.2%** 43	NS	**0%** 16	NS	**0%** 7

Proposed Diazinon Acute Toxicity Target = 0.16 µg/L

[a]Percent of samples for the year that exceed the proposed diazinon acute toxicity target value.

[b]Total number of samples analyzed for diazinon during the year.

NS = No samples analyzed during the year.

Table 1.6. Annual Exceedances of Proposed Chlorpyrifos Acute Toxicity Water Quality Objective at the Mainstem Sites of the San Joaquin River (1991 – 2005)

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SJR near Vernalis	**0%**[a] 174[b]	**0.50%** 179	**4.5%** 155	**1.9%** 102	**7.1%** 14	NS	**0%** 320	**0%** 9	**0%** 43	**2.4%** 333	**0%** 542	**0%** 145	**0%** 39	**3.2%** 31	**0%** 23
SJR at Maze Blvd.	**0%** 3	**0%** 5	**0%** 2	NS	NS	NS	NS	NS	NS	NS	**0%** 20	NS	NS	NS	NS
SJR at Crows Landing	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	**8.7%** 23	**50%** 6	**3%** 33	**6.7%** 15	NS
SJR near Patterson	NS	NS	NS	**20%** 5	NS	NS	NS	NS	NS	**0%** 1	**0%** 40	**12%** 8	NS	NS	**0%** 9
SJR near Newman	**0%** 28	**0%** 28	**0%** 2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SJR near Stevinson at Lander Ave.	**0%** 3	**0%** 5	**50%** 2	**0%** 1	NS	NS	NS	NS	NS	**5%** 20	**0%** 43	NS	**5.9%** 17	NS	**0%** 7

Proposed Chlorpyrifos Acute Toxicity Water Quality Objective = 0.025 µg/L

[a]Percent of samples for the year that equal or exceed the proposed chlorpyrifos acute toxicity water quality objective value.

[b]Total number of samples analyzed for chlorpyrifos during the year.

NS = No samples analyzed during the year.

Table 1.7. Basin Plan Method Analysis of Annual Exceedances of Combined Diazinon and Chlorpyrifos Toxicity at the Mainstem Sites of the San Joaquin River (1991 – 2005)

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SJR near Vernalis	**0%**[a] 169[b]	**3%** 200	**15%** 264	**22%** 103	**7.1%** 14	**0%** 3	**0%** 35	**2.4%** 42	**2.4%** 42	**1.4%** 71	**19%** 64	**0%** 12	**0%** 42	**2.7%** 36	**4.2%** 24
SJR at Maze Blvd.	**0%** 2	**20%** 5	**50%** 2	NS	NS	NS	NS	NS	NS	NS	**0%** 20	NS	NS	NS	NS
SJR at Crows Landing	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	**8.7%** 23	**38%** 8	**2.8%** 36	**4.0%** 25	NS
SJR near Patterson	NS	NS	NS	**20%** 5	NS	NS	NS	NS	NS	**0%** 1	**0%** 40	**11%** 9	NS	NS	**0%** 9
SJR near Newman	**4.5%** 22	**4.5%** 22	**50%** 2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SJR near Stevinson at Lander Ave.	**0%** 3	**0%** 5	**50%** 2	**0%** 1	NS	NS	NS	NS	NS	**5%** 20	**14%** 43	NS	**5.9%** 17	NS	NS

[a]Percent of samples for the year for which the combined (additive) toxicity value equals or exceeds 1.0.

[b]Total number of samples analyzed for chlorpyrifos and/or diazinon during the year.

NS = No samples analyzed during the year. Acute diazinon WQO = 0.16µg/L; acute chlorpyrifos WQO = 0.025 µg/L.

Table 1.8 Annual Exceedances of Proposed Diazinon Acute Toxicity Target at the Tributary Sites of the San Joaquin River

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Stanislaus River at Caswell State Park	**0%**[a] 6[b]	**0%** 13	**0%** 2	**0%** 1	NS	NS	NS	NS	NS	**0%** 20	**0%** 41	**0%** 9	**0%** 31	**3.2%** 31	**17%** 23
Tuolumne River at Shiloh Road	**0%** 2	**13%** 15	**50%** 2	**100%** 1	NS	NS	NS	NS	NS	**0%** 20	**2.01%** 49	**0%** 20	**0%** 32	**0%** 31	**13%** 22
Del Puerto Creek at Vineyard Road	**9%** 11	**27%** 18	**0%** 2	**0%** 1	NS	NS	NS	NS	NS	**45%** 11	**0%** 23	**0%** 16	**0%** 35	NS	NS
Orestimba Creek at River Road	**12%** 8	**21%** 66	**18%** 50	**0%** 1	**0%** 1	**2.8%** 254	**13%** 160	**0%** 32	**0%** 36	**11%** 46	**0%** 45	**18%** 27	**0%** 33	NS	NS
Merced River at River Road	**0%** 4	**6.2%** 16	**9.5%** 42	**14%** 50	**3.6%** 28	NS	**0%** 10	**0%** 15	**0%** 15	**0%** 32	**6.7%** 45	**0%** 8	**0%** 32	**0%** 23	**0%** 14
Mud Slough near Gustine	**0%** 3	**0%** 5	**50%** 2	**0%** 1	NS	NS	NS	NS	**0%** 1	NS	**4.5%** 22	NS	NS	NS	NS
Salt Slough at Lander Avenue	**0%** 4	**19%** 16	**11%** 28	**0%** 1	NS	NS	NS	NS	NS	NS	**4.5%** 22	NS	**0%** 17	NS	NS
TID Lateral 5 (Harding Drain)	**0%** 7	**17%** 41	**60%** 5	**0%** 1	NS	NS	NS	NS	NS	**0%** 11	**0%** 2	NS	NS	NS	NS
Ingram/Hospital Creeks at River Road	**25%** 12	**32%** 19	**100%** 2	**0%** 2	NS	NS	NS	NS	NS	NS	**25%** 4	NS	NS	NS	NS
Spanish Grant Drain near Patterson	**0%** 6	**7.1%** 14	**50%** 2	**0%** 1	NS	NS	NS	NS	NS	NS	**0%** 2	NS	NS	NS	NS

Proposed Diazinon Acute Toxicity Target = 0.16 µg/L

[a]Percent of samples for the year that exceed the proposed diazinon acute toxicity target value.

[b]Total number of samples analyzed for diazinon during the year.

NS = No samples analyzed during the year.

Table1.9 Annual Exceedances of Proposed Chlorpyrifos Acute Toxicity Water Quality Objective at the Tributary Sites (1991 – 2005)

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Stanislaus River at Caswell State Park	**0%** 6	**0%** 13	**0%** 2	**0%** 1	NS	NS	NS	NS	NS	**0%** 20	**4.9%** 41	**0%** 9	**6.1%** 33	**3.1%** 32	**0%** 23
Tuolumne River at Shiloh Road	**0%** 2	**6.7%** 15	**0%** 2	**0%** 1	NS	NS	NS	NS	NS	**0%** 20	**0%** 49	**4.8%** 21	**3.0%** 33	**3.2%** 31	**14%** 14
Del Puerto Creek at Vineyard Road	**22%** 9	**15%** 20	**0%** 4	**100%** 1	NS	NS	NS	NS	NS	**0%** 11	**22%** 23	**19%** 16	**14%** 35	NS	NS
Orestimba Creek at River Road	**50%** 8	**28%** 65	**27%** 51	**100%** 1	**100%** 1	**32%** 243	**29%** 198	**12%** 32	**5.4%** 37	**2.1%** 47	**18%** 45	**7.4%** 27	**16%** 32	NS	NS
Merced River at River Road	**0%** 4	**19%** 16	**46%** 41	**26%** 46	**0%** 33	NS	**0%** 10	**0%** 15	**0%** 15	**0%** 31	**2.3%** 43	**0%** 9	**0%** 32	**0%** 24	**33%** 15
TID Lateral 5 (Harding Drain)	**57%** 7	**32%** 40	**28%** 7	**0%** 1	NS	NS	NS	NS	NS	**0%** 9	**0%** 2	NS	NS	NS	NS
Ingram/Hospital Creeks at River Road	**27%** 11	**9.5%** 21	**0%** 2	**0%** 2	NS	NS	NS	NS	NS	0% 4	NS	NS	NS	NS	NS
Spanish Grant Drain near Patterson	**83%** 6	**57%** 14	**0%** 3	**25%** 4	NS	NS	NS	NS	NS	NS	**0%** 2	NS	NS	NS	NS
Mud Slough near Gustine	**0%** 3	**0%** 5	**0%** 2	**0%** 1	NS	NS	NS	NS	**0%** 1	NS	**4.5%** 22	NS	NS	NS	NS
Salt Slough at Lander Ave.	**0%** 3	**6.7%** 15	**21%** 28	**0%** 1	NS	NS	NS	NS	NS	NS	**14%** 22	**100%** 1	**0%** 18	NS	NS

Proposed Chlorpyrifos Acute Toxicity Water Quality Objective = 0.025 µg/L

[a]Percent of samples for the year that equal or exceed the proposed chlorpyrifos acute toxicity water quality objective value.

[b]Total number of samples analyzed for chlorpyrifos during the year.

NS = No samples analyzed during the year.

Table 1.10. Basin Plan Method Analysis of Annual Exceedances of Combined Diazinon and Chlorpyrifos Toxicity at the Tributary Sites (1991 – 2005)

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Stanislaus River at Caswell State Park	**0%**[a] 5[b]	**0%** 13	**0%** 2	**0%** 1	NS	NS	NS	NS	NS	**0%** 20	**4.1%** 41	**0%** 9	**5.7%** 34	**13%** 30	**30%** 23
Tuolumne River at Shiloh Road	**0%** 2	**13%** 15	**50%** 2	**100%** 1	NS	NS	NS	NS	NS	**4.8%** 21	**10%** 49	**4.5%** 22	**0%** 36	**6.4%** 31	**17%** 23
Del Puerto Creek at Vineyard Road	**40%** 10	**50%** 18	**0%** 2	**100%** 1	NS	NS	NS	NS	NS	**45%** 11	**22%** 23	**17%** 16	**14%** 35	NS	NS
Orestimba Creek at River Road	**50%** 8	**58%** 66	**40%** 50	**100%** 1	**100%** 1	**40%** 244	**46%** 132	**12%** 32	**5.6%** 36	**15%** 46	**22%** 46	**22%** 31	**14%** 35	NS	NS
Merced River at River Road	**0%** 4	**19%** 16	**48%** 42	**30%** 50	**3.4%** 29	NS	**0%** 10	**0%** 15	**0%** 15	**0%** 32	**9.1%** 44	**0%** 9	**0%** 33	**0%** 26	**21%** 14
Mud Slough near Gustine	**0%** 3	**0%** 5	**50%** 2	**0%** 1	NS	NS	NS	NS	**0%** 1	NS	**9%** 22	NS	NS	NS	NS
Salt Slough at Lander Ave.	**0%** 3	**25%** 16	**36%** 28	**0%** 1	NS	NS	NS	NS	NS	NS	**18%** 22	**0%** 1	**0%** 18	NS	NS
TID Lateral 5 (Harding Drain)	**57%** 7	**46%** 41	**80%** 5	**0%** 1	NS	NS	NS	NS	**0%** 1	**0%** 9	**0%** 2	NS	NS	NS	NS
Ingram/Hospital Creeks at River Road	**54%** 11	**37%** 19	**100%** 2	**0%** 2	NS	NS	NS	NS	NS	NS	**25%** 4	NS	NS	NS	NS
Spanish Grant Drain near Patterson	**83%** 6	**57%** 14	**50%** 2	**100%** 1	NS	NS	NS	NS	NS	NS	**0%** 2	NS	NS	NS	NS

[a]Percent of samples for the year for which the combined (additive) toxicity value equals or exceeds 1.0.
[b]Total number of samples analyzed for chlorpyrifos and/or diazinon during the year.
NS = No samples analyzed during the year.

Table 4.1. Water quality criteria for diazinon

Aquatic Life Criteria for Surface Water	**µg/L**
CDFG Aquatic Life Criteria for freshwater – 4 day average concentration	0.05
CDFG Aquatic Life Criteria for freshwater – 1 hour maximum concentration	0.08
Recalculated CDFG Aquatic Life Criteria for freshwater – 4 day average concentration	0.10
Recalculated CDFG Aquatic Life Criteria for freshwater – 1 hour maximum concentration	0.16
EPA Draft Aquatic Life Criteria for freshwater – 4 day average concentration	0.10
EPA Draft Aquatic Life Criteria for freshwater – 1 hour maximum concentration	0.10
Australian and New Zealand trigger values (95% protection- based on NOEC)	0.010
Australian and New Zealand trigger values (99% protection – based on NOEC)	0.00003
1/10th Species mean average value (*Ceriodaphnia dubia*)[1] (Basin Plan)	0.044
Human Health Criteria for Drinking Water	
US EPA Suggested No Adverse Response Levels (SNARL) for non-cancer toxicity	0.600
California Department of Health Services State Action Level for Toxicity	6.000
National Academy of Sciences SNARL for non-cancer toxicity	14.000
Canadian Environmental Quality Guidelines	20.000

Table 4.2 Water quality criteria for chlorpyrifos

Aquatic Life Criteria for Surface Water	**µg/L**
CDFG Aquatic Life Criteria for freshwater – 4 day average concentration	0.014
CDFG Aquatic Life Criteria for freshwater – 1 hour maximum concentration	0.02
EPA Draft Aquatic Life Criteria for freshwater – 4 day average concentration	0.041
EPA Draft Aquatic Life Criteria for freshwater – 1 hour maximum concentration	0.083
Canadian Environmental Quality Guidelines	0.0035
Australian and New Zealand trigger values (95% protection based on NOEC)	0.010
Australian and New Zealand trigger values (99% protection based on NOEC)	0.00004
1/10th Species mean average value (*Ceriodaphnia dubia*)[2] (Basin Plan)	0.006
Human Health Criteria for Drinking Water	
US EPA Suggested No Adverse Response Levels (SNARL) for non-cancer toxicity	20.000
Canadian Environmental Quality Guidelines	90.000
Agriculture-Livestock	
Canadian Environmental Quality Guidelines	24.000

Sources: Marshack, 2003; Canadian Council of Ministers of the Environment, 2002; US EPA 2003; Siepmann and Finlayson, 2000; Finlayson, 2004; Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000.

[1] The species mean average value reported by Siepmann and Finlayson, 2000 is 0.44 µg/L for diazinon acute toxicity tests accepted by CDFG. *Ceriodaphnia dubia* is the most sensitive species when the reported results for *Gammarus fasciatus* are not considered (see discussion in Section 1.2.1 below).

[2] The species mean average value reported by Siepmann and Finlayson, 2000 is 0.06 µg/L for chlorpyrifos acute toxicity tests. Of the freshwater species tested, *Ceriodaphnia dubia* is the most sensitive to chlorpyrifos.

Table 4.3. Summary of potential freshwater water quality objectives derived by alternate methods

	Diazinon		Chlorpyrifos	
ALTERNATIVE	**Acute (μg/L)**	**Chronic (μg/L)**	**Acute (μg/L)**	**Chronic (μg/L)**
1. No Change	0.16[1] 0.042[2]	0.10[1]	0.025[3]	0.015[3]
2. No diazinon or chlorpyrifos	0 or non detect	0 or non detect	0 or non detect	0 or non detect
3. CDFG/US EPA Method	0.16[1]	0.10[1]	0.025[3]	0.015[3]

1. Regional Board staff calculations based on CDFG data set, using US EPA method. The acute criterion is a one-hour average and the chronic criterion is a four-day average – neither to be exceeded more than once every three years on the average.
2. Daily maximum based on 1/10th of the 96-hour LC50 for *Ceriodaphnia dubia*. 0.420 μg/L is found from averaging the LC50s found by CDFG (2000) and US EPA (2004).
3. CDFG (Siepmann and Finlayson, 2000) acute criterion recalculated by Regional Board staff to two significant figures per the US EPA methodology (1985).

Table 4.4 Comparison of historical data to the alternate acute water quality objectives (1991 – 2005)

Target	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Diazinon = 0 µg/L	**15%**[a] 171[b]	**32%** 232	**44%** 272	**54%** 126	**100%** 14	NS[c]	**29%** 34	**37%** 43	**25%** 44	**68%** 95	**87%** 191	**12%** 26	**1.2%** 85	**20%** 45	**86%** 7
Diazinon = 0.042 µg/L	**9.4%** 171	**20%** 232	**33%** 272	**40%** 126	**14%** 14	NS	**8.8%** 34	**26%** 43	**9.1%** 44	**19%** 95	**17%** 191	**3.8%** 26	**0%** 85	**4.4%** 45	**0%** 7
Diazinon = 0.16 µg/L	**0%** 171	**3.0%** 232	**13%** 272	**14%** 126	**0%** 14	NS	**0%** 34	**0%** 43	**0%** 44	**0%** 95	**5.8%** 191	**0%** 26	**0%** 85	**0%** 45	**0%** 7
Chlorpyrifos = 0 µg/L	**1.5%** 195	**11%** 235	**9.6%** 260	**23%** 124	**28%** 14	NS	**18%** 34	**25%** 12	**41%** 43	**64%** 96	**53%** 191	**48%** 25	**17%** 90	**56%** 45	**100%** 8
Chlorpyrifos = 0.025 µg/L	**0%** 195	**0.4%** 235	**3.5%** 260	**1.6%** 124	**7.1%** 14	NS	**0%** 34	**0%** 12	**0%** 43	**1.0%** 96	**1.0%** 191	**16%** 25	**2.2%** 90	**2.2%** 45	**0%** 8

[a]% of samples exceeding target
[b]total number of samples for the year
[c]NS = No samples analyzed during the year

Data for San Joaquin River monitoring sites at:
Lander Avenue (Highway 165) near Stevinson
Hills Ferry Road near Newman
Las Palmas Avenue near Patterson
Airport Road near Vernalis
Maze Boulevard
Crows Landing

Table 4.5. Assessment of chlorpyrifos alternatives for their consistency with Porter-Cologne and other state and federal requirements.

Porter-Cologne Requirements	**No Change**	**No Chlorpyrifos**	**CDFG/ US EPA**
Beneficial Uses	+	+	+
Environmental Characteristics	0	0	0
Conditions Reasonably Achievable	+	-	+
Economic Considerations	+	-	+
Need for Housing	0	0	0
Need to Recycle Water	0	0	0
State and Federal Laws and Policies	**No Change**	**No Chlorpyrifos**	**CDFG/US EPA**
Anti-degradation	C	C	C
Clean Water Act	C	C	C
ESA	C	C	C

Scores indicate relative degree of protection; attainability; achievability; impact or consistency with policy, as applicable, with 0 indicating neutral:

Beneficial Uses: Not protective of beneficial uses: - Fully protective: +

Environmental Characteristics: Not attainable: - Fully attainable: +

Achievability: Difficult to acheive - Readily achievable: +

Economic Considerations: Potentially sigtnificant impact: - Modest or no negative impact: +

Housing: Significant housing impact: - Little or no impact: +

Recycling Water: Significant impact on recycling water: - Little or no impact: +

C = Consistent

Table 4.6. Assessment of diazinon alternatives for their consistency with Porter-Cologne and other state and federal requirements.

Porter-Cologne Requirements	No Change	No Diazinon	CDFG/US EPA
Beneficial Uses	+	+	+
Environmental Characteristics	0	0	0
Conditions Reasonably Achievable	+	-	+
Economic Considerations	+	-	+
Need for Housing	0	0	0
Need to Recycle Water	0	0	0
State and Federal Laws and Policies	**No Change**	**No Diazinon**	**CDFG/US EPA**
Anti-degradation	C	C	C
Clean Water Act	C	C	C
ESA	C	C	C

Scores indicate relative degree of protection; attainability; achievability; impact or consistency with policy, as applicable, with 0 indicating neutral:

Beneficial Uses: Not protective of beneficial uses: - Fully protective: +

Environmental Characteristics: Not attainable: - Fully attainable: +

Achievability: Difficult to acheive: - Readily achievable: +

Economic Considerations: Potentially significant impact: - Modest or no negative impact: +

Housing: Significant housing impact: - Little or no impact: +

Recycling Water: Significant impact on recycling water: - Little or no impact: +

C = Consistent

Table 4.7 River Reaches and Their Tributary Subareas

SJR Reach	Tributary Subareas
Mendota Dam to Sack Dam	Grassland
Sack Dam to Lander Avenue (near Stevinson)	Fresno-Chowchilla, Bear Creek
Lander Avenue (near Stevinson) to Hills Ferry Road (near Newman)	Grassland, Stevinson
Hills Ferry Road (near Newman) to Las Palmas Avenue (near Patterson)	Greater Orestimba, Turlock, Merced
Las Palmas Avenue (near Patterson) to Maze Boulevard	Westside Creeks, Northeast Bank, Tuolumne
Maze Boulevard to Airport Road (near Vernalis)	Vernalis North, North Stanislaus, Stanislaus

Table 4.8 Number and Magnitude of Observed Exceedances of Proposed Loading Capacity for Combined Diazinon and Chlorpyrifos Toxicity in the mainstem SJR (2000-2004)

Sampling Location on the SJR	Number of observed exceedances of proposed loading capacity for combined toxicity (2000-2004)	Average % reduction required to meet Loading Capacity for combined toxicity during observed exceedances (2000-2004)	Maximum % reduction required to meet Loading Capacity for combined toxicity during observed exceedances (2000-2004)
near Vernalis	15 (217 samples)	26%	40%
at Maze Blvd.	0 (20 samples)	No observed exceedances	No observed exceedances
at Los Palmas Av. near Patterson	1 (50 samples)	40%	40%
at Hills Ferry Rd. near Newman	Not Sampled	Not Sampled	Not Sampled
near Stevinson at Lander Avenue	9 (79 samples)	41%	70%

Table 4.9 Number and Magnitude of Observed Exceedances of Proposed Loading Capacity for Combined Diazinon and Chlorpyrifos Toxicity in SJR Tributaries (2000-2004)

Sampling Location	Number observed exceedances of proposed load allocations for combined toxicity / number of samples (2000-2004)	Average % reduction required to meet Loading Capacity for combined toxicity during observed exceedances (2000-2004)	Maximum % reduction required to meet Loading Capacity for combined toxicity during observed exceedances (2000-2004)
Stanislaus River at Caswell State Park	2 (132 samples)	65%	76%
Tuolumne River at Shiloh Road	9 (153 samples)	25%	55%
Del Puerto Creek at Vineyard Road	18 (85 samples)	61%	85%
Orestimba Creek at River Road	29 (155 samples)	76%	98%
Merced River at River Road	4 (140 samples)	58%	70%
Mud Slough near Gustine	2 (22 samples)	38%	54%
Salt Slough at Lander Avenue	4 (22 samples)	82%	94%
TID Lateral 5 (Harding Drain)	0 (29 samples)	no observed exceedances	no observed exceedances
Ingram/Hospital Creeks at River Road	1 (4 samples)	11%	11%
Spanish Grant Drain Near Patterson	0 (2 samples)	no observed exceedances	no observed exceedances

Table 5.1 Summary of Differences in Dormant Season Pest Management Costs

	Almond		Peach		Apple	
	Total cost ($)	Percent Change from Base Case	Total cost ($)	Percent Change from Base Case	Total cost ($)	Percent Change from Base Case
Base Case (diazinon)	$2,749	NA	$3,951	NA	$11,692	NA
Base Case (chlorpyrifos)	$2,735	NA	$3,917	NA	$11,688	NA
Scenario 1	$2,750	1%	$3,937	0%	$11,673	0%
Scenario 2	$2,778	2%	$4,000	1%	$11,741	0%
Scenario 3	$2,760	1%	$3,962	1%	$11,703	0%
Scenario 4	$2,898-$2,909	6%	$4,078	3%	$11,832	1%
Percent change from Base Case		1% to 6%		0% to 3%		0% to 1%

Table 5.2 Surface Irrigation - Initial Capital Cost and Recurring Maintenance Costs
(from Burt et al. 2000)

System Type	Capital $/acre	Maintenance $/acre/year	Labor hrs/acre	Energy kwh/ac-in
Basin Irrigation	3192	51	0.3	n/a
Border Strip	2228	51	0.4	n/a
Contour Ditch	140	13	2.5	n/a
Continuous Flood	1010	26	0.3	n/a
Furrow	1703	51	1	n/a
Corrugation	1475	51	1.25	n/a

Table 5.3 Sprinkler Irrigation - Initial Capital Cost and Recurring Maintenance Costs
(from Burt et al. (2000)

System Type	Capital $/acre	Maintenance $/acre/year	Labor hrs/acre	Energy kwh/ac-in
Hand Move Lateral	225	5	0.175	15.4
End Row Lateral	325	10	0.103	15.4
Side Roll Lateral	388	8	0.123	15.4
Traveling Gun	450	27	0.072	43.2
Center Pivot	363	18	0.01	16.5
Center Pivot w/corner	450	27	0.01	17.5
Linear Move w/ditch	488	29	0.021	16.5
Linear Move w/pipe	738	44	0.021	19.5
Portable Solid Set	1200	24	0.103	15.4
Permanent Solid Set	1163	12	0.01	15.4

Table 5.4 Micro-irrigation - Initial Capital and Maintenance Costs
(from Burt et al (2000)

System Type	Capital $/acre	Maintenance $/acre/year	Labor hrs/acre	Energy kwh/ac-in
Drip Vineyards	1050	105	0.04	10.95
Drip Orchards Surface	850	85	0.04	10.95
Drip Orchards Subsurface	1100	110	0.04	10.95
Micro Orchards	950	95	0.04	10.95
Drip Row Surface	700	70	0.04	10.95
Drip Row Subsurface	1700	170	0.04	10.95

Table 5.5. Estimated Cost to Convert from Flood to Sprinkler Irrigation

	Almonds		Walnuts	
Total acres in TMDL area	231,788[1]	231,788[1]	28,057[1]	28,057[1]
Estimated percent in flood irrigation	40%[2]	60%[3]	40%[2]	60%[3]
Estimated acres in flood irrigation	92,715	139,073	11,223	16,834
Estimated percentage acres using diazinon or chlorpyrifos	30%[1]	30%[1]	65%[1]	65%[1]
Increased cost/acre for sprinkler irrigation	$196	$196	$196	$196
Total increased cost to convert acres using diazinon or chlorpyrifos to sprinkler irrigation	$5,451,654	$8,177,492	$1,429,810	$2,144.652

1.From 2002 PUR
2 Estimate based on information from USDA 1998 Farm and Ranch Irrigation Survey
3 Estimate based on information from Zoldoske. 2002

Table 5.6 Drainage Practices Capital and Maintenance Costs

System Type	Capital $/acre	Maintenance $/acre/year
Surface Drainage Recirculation	812	55
Temporary Retention Ponds	340	50

Table 5.7 Summary of Differences in Irrigation Season Pest Management Costs

	Almond		Alfalfa	
	Total cost ($)	Percent Change from Base Case	Total cost ($)	Percent Change from Base Case
Base Case (chlorpyrifos)	$2,781	NA	$1,009	NA
Scenario 1	$2,884	3.7%	$1,124	11.4%
Scenario 2	$2,871	3.2%	$1,084	7.4%
Scenario 3	$2,899	4.2%		
Percent change from Base Case		3.2% to 4.2%		7.4% to 11.4%

Table 7.1 Summary of Public Workshops

Date	Workshop
August 2000	Initial Outreach of OP Pesticide TMDL
November 2000	Initial Stage of the TMDL Development / Draft Problem Statement
January 2001	Introduced Elements of TMDL and Monitoring Data
June 2001	Draft Numeric Target Report
March 2002	Draft Source Analysis Report
July 2002	Draft TMDL Report
September 2002	Draft TMDL Implementation Framework
January 2005	CEQA Scoping Meeting and Public Workshop